

HOW ELECTRICITY IS CONQUERING STEAM FOR MOTIVE POWER

Puffing and Screeching Monsters Must Give Way to Noiseless, Smokeless, Dirtless Electric Motors.

Long-Distance Electric Roads Installed in All Parts of the United States and in Other Countries

MUCH as the steam locomotive has done in the development of this country, its career is gradually drawing to a close. The handwriting has appeared upon the wall, and its decrees are that the puffing, screeching monster, belching clouds of smoke and showering cinders, must give way to the electric motor, without noise or dirt, not only in the transportation of passengers, but also for heavy freight hauling.

On short lines through densely populated districts electricity has for several years taken the place of steam, and thoroughly demonstrated its superiority as a motive power. But railway managers, while rather reluctantly admitting the good points of the electric motor, declared that for long-distance travel and heavy hauling the electric motive power would be inadequate, excessive in cost, and therefore impractical.

Their argument was that electricity must be generated by steam, and therefore it would be more economical and practicable to apply the steam direct in the engines.

Result of Tests.

Actual tests made recently have demonstrated that the cost of transportation is greater by the steam engine than by the electric engine. A steam train of five cars and a standard engine weighs 230 tons, and will accommodate 168 passengers. It uses at full speed 1,400 horsepower.

The electric motor and four trailer cars weigh 50 tons, seat 150 passengers, and use 1,000 horsepower. The electric train weighs less, uses less horsepower, carries more passengers, and goes faster.

There are still some difficulties to be overcome before steam can be done away with. One of the most serious of them is the question of the motor unit.

If a steam locomotive breaks down, it affects that motor unit only. But if the motive power of an electric road is put out of commission everything on the road, or at least on a very considerable section of it, comes to a standstill. In other words, the electric road carries all its eggs in one basket.

Source of Danger.

Such a condition of affairs is more or less precarious. It would lay a road open to clandestine attacks from unprincipled and malicious rivals who could by striking at the vulnerable spot, paralyze the entire service. In case of a strike the attack of the men could be directed exclusively upon the "powerhouses," or, simpler than that, destroy the connections along some lonely and unguarded section of the road.

And then there is another thing. The third rail seems to be an essential feature of the electric road's equipment. At least, up to the present time there does not appear to be any entirely satisfactory substitute for the third rail system in anything like heavy electric railroads.

The stringing of these heavily charged rails over a wide section of country involves great possibilities of danger unless some better way of protecting them is devised than any now in use. And how are they to be protected if the shoe of the motor car is to come in constant contact with them, as it must if it is to pick up the power?

Extensions Continue.

These are the difficulties that are still to be overcome. But without waiting for every obstacle to be surmounted, the extension of the electric roads is continuing. The New York Central is using electric power on all portions of its lines which have been operated by steam at a loss. Railroads all over the country are following this example. The

Lackawanna and Wyoming Valley roads, owned by the Westinghouse company, have experimented on the relative cost of electricity as compared with steam, having in view the substitution of the former if practicable. The actual tests showed an economy of 30 per cent in the use of the electric motor as compared with the steam system.

Long distance electric roads are rapidly extending. The Lake Shore road is paralleled by an electric road from Cleveland to Toledo. Toledo is connected in the same way to Detroit. The electric road between Buffalo and Cleveland is rapidly nearing completion, so that in a short time there will be a continuous electric road in operation from Buffalo through Erie, Cleveland, and Toledo to Detroit.

Even in Mexico.

From every direction come reports of the substitution of electricity for steam on railroads. The oldest line in the Republic of Mexico, known as the "Queen's Own," has decided to do away with the steam locomotive. A thorough investigation of the industrial and financial aspects of the situation convinced the English board of officials that the scheme was not only perfectly practicable, but highly desirable.

The plan provides for electric traction for the entire line from the capital to the seacoast. Two plants are planned, one at Atotzacuba to furnish power for trains between Vera Cruz and Esperanza, and the other at Mecaxa for service between Esperanza and Mexico.

The power plant at Atotzacuba will be run by water power and will supply sufficient power for the propulsion of trains along the mountain division. Negotiations are pending with a Mexica company for power along the plateau division which has scarcely any grade.

The system recommended is the trolley system and it is estimated the company would save approximately \$500,000 annually in coal.

Electric Car Service.

And the electric trains that are taking the place of those propelled by steam are not merely a number of motors and trailers strung together. They are thoroughly equipped passenger trains built for speed and the comfort of the passengers. On the road from Columbus, Ohio, to Pittsburgh splendidly equipped motor and sleeping cars are being operated with absolute success. They are built to afford as much comfort for night travel as the present Pullman service, and in addition are lit by electricity, which is not the case on most railroads in the country. Moreover, there is no trouble from soot, smoke, and cinders.

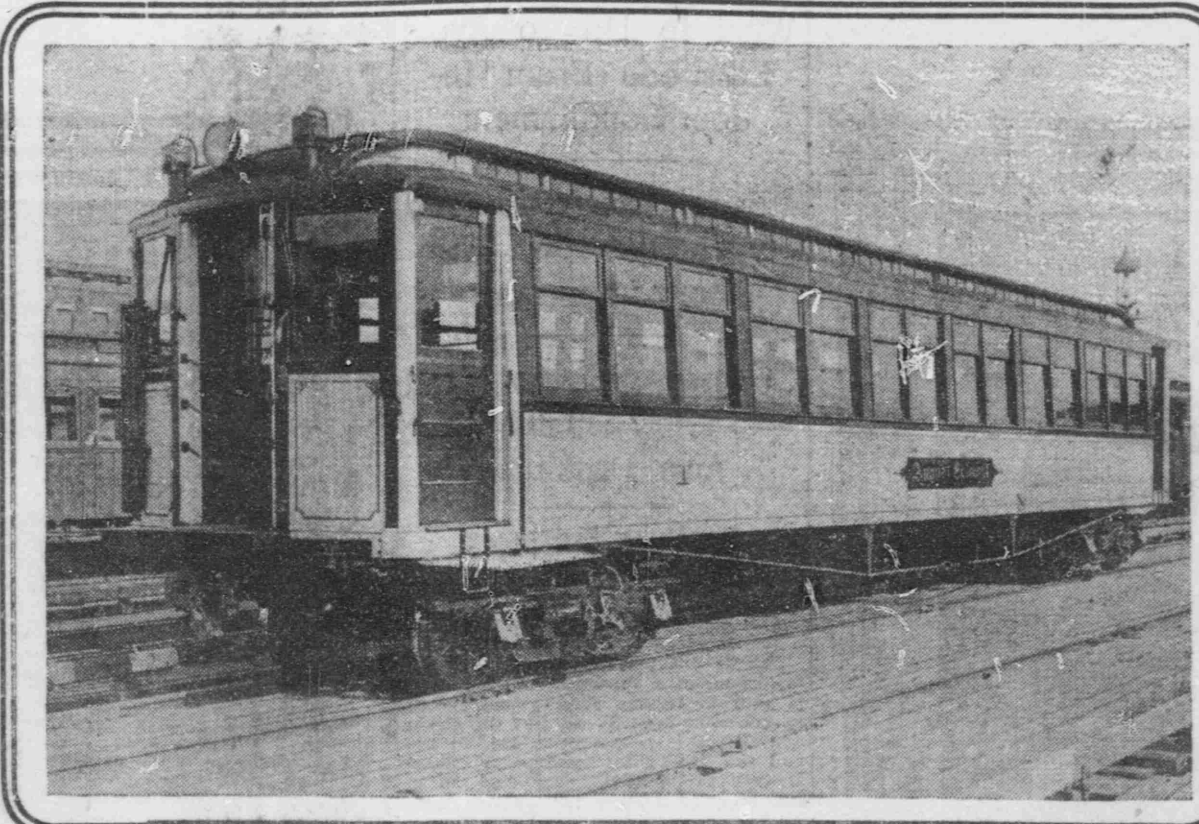
The problem of high speed for passenger service and greater power for freight traffic has been, it is generally believed, solved by the experiments recently made on the Ballston extension of the Shenectady Railway, where cars are run with alternating current equipment just perfected.

Application of Power.

The motors used can be run either from a 2,000 volt alternating current, stepped down in the car to 400 volts, or from a 600 volt direct current. The electric railway motors in general use are operated, as is well known, by a direct current with a trolley voltage of about 600 volts.

It is claimed that the new motor, which can use direct or alternating currents of widely varying voltage, has cleared the way for the adoption of electric power for light or heavy trains, freight or passenger, on lines of any length.

Just at first, the traveling public will



NEW YORK'S NEW MOTOR CAR.

The August Belmont Type of the Powerful Electric Vehicle Which Will Be Used in the Subway of the Metropolis.

probably entertain some doubts and fears in regard to the long distance travel. They are used to the steam-powered trains and know about what is the percentage of their chances for getting killed or maimed. One point has been raised, and that is the comparatively small experience the engineers of the motor trains will have to start upon, when the project of putting long distance runs into effect becomes feasible. It will be found upon investigation that the motormen in charge of the heavy electric trains now in service compare most favorably with their brother engineers in charge of the steam locomotives.

Some Qualities Required.

In the driving of a fast, heavy electric train, very much the same qualities and equipment are required that are required in the engineer of a steam locomotive. Brains are required in both cases; brains and quick cool judgment power of maintaining concentrated and alert attention during intervals of considerable length.

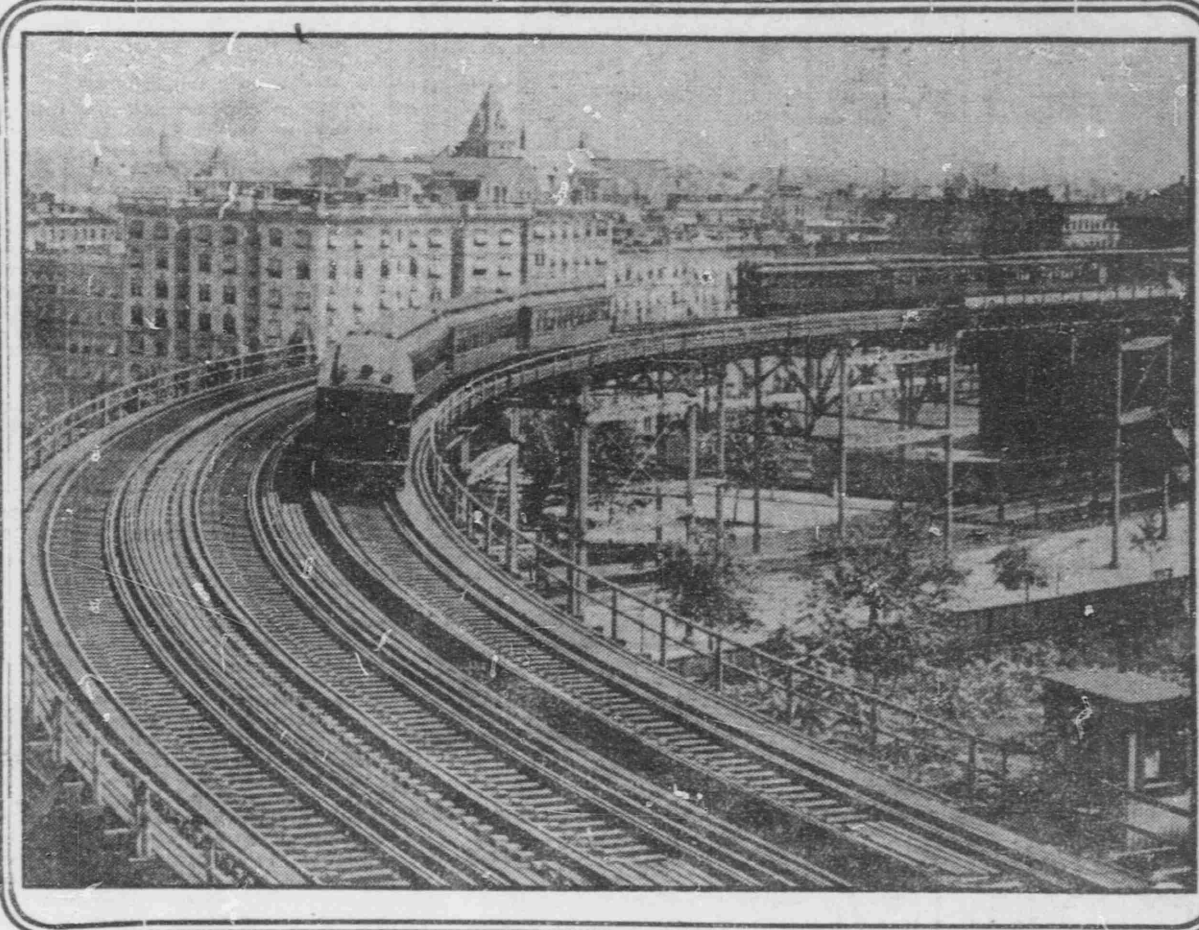
Combined with this, of course, there must be the temperate, orderly life on the part of the motorman or engineer, without which those necessary qualifications cannot be counted upon. It is true that the man at the controller of an electric car need not be equipped, as the good engineer is, to just about rebuild his engine as it stands on the tracks, but he is required to have first-class mechanical training and adaptability in other directions.

When people trust their lives in a railroad train, whether the motive power be steam or electricity, they are entitled to have a man in control of the power that whirls them at such great speed through the country who is a first-class man in every respect—in brain, in vigor, and in responsibility of character.

Change Will Be Gradual.

It is not proposed to supplant steam locomotion all at once. The complete use of electricity must be approached gradually and with careful attention to the defects that are sure to crop up, as was the case at the commencement of the steam era. It is proposed to commence with the passenger service where rapid transit and cleanliness, combined with comfort, are the most essential points to be considered. The locomotives on hand are to be used on parallel tracks for freight hauling and emergencies in the electric line that may develop under the new system.

The electric motors are not as expensive as the steam locomotives, and for that reason a greater number of trains can be operated and maintained on a



THE LATEST APPLICATION OF ELECTRICITY TO RAPID TRANSIT.

Looking Northeast Over the Curve of the Manhattan Elevated Railway at 110th Street, New York. The Trestle Here Is Sixty Feet High. (From Stereograph, copyright, by Underwood & Underwood, New York.)

schedule based on a very short headway. For runs of a distance such as between Washington and New York, trains could be arranged for every hour, or even twice an hour. They would be lighter than those made up for long cross-country service and would therefore be capable of very high speed.

A Question of Months.

It is merely a question of months before all the suburban service from the larger cities will be operated by electric. The reduced cost of operation makes it possible to charge about one-

half the fare of the steam roads, and for this reason the present railroad managements will be forced to adopt the new system. Should they delay the change too long they would find their trackage paralleled by rival electric companies who could soon drive them out of business in the one-sided competition.

The steam engineers are acutely alive to the possibilities of electricity. The brotherhood of locomotive engineers are facing the inevitable decline of their power. They fear that under the new regime they will be supplanted and their

new motormen. To comply with the demand that the brotherhood is prepared to enforce would mean an additional cost to the subway operation of about \$50,000 a year. Belmont is opposed to granting the demand, not because of the increased cost, which would not figure largely when the total receipts and expenditures of the subway are considered, but because of two principles, one of which is vital and the other sure to become vital.

The first is the right of employees of one corporation to dictate to the management of another corporation what

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Each department is under a chief, who is responsible for everything that goes on there. He or she has as many assistants as necessary. The housekeeper, for instance, has six assistants, each in charge of a certain number of floors. When one remembers that there are 700 rooms to look after—most of them bedrooms—that there are innumerable pieces of linen to keep clean, and many other duties peculiar to the conduct of a great public house, it can be seen that none of these positions is a sinecure.

There are over 800 beds to look after. There are at least 3,000 pairs of sheets. There are over 5,000 towels for the sleeping rooms. There are pillow slips and other linen necessities in proportion.

There are over 25,000 table napkins to be cared for. There are 15,000 pieces of furniture in the building, and all must be kept clean and in repair.

The cleaning operations are charted separately on the hotel war map. There is a head cleaner, with eight assistants, and a working force of fifty. One hundred chambermaids look after the rooms, and forty linen-room girls and seamstresses are busy keeping the stock in good shape.

The hotel has 200 waiters, all responsible to the head waiter of the establishment. Each large dining-room has its own head waiter, a first assistant, between four captains, who manage squads and keep things moving. There are eighty-five bell boys and forty-five porters, "omnibuses" (waiters' assistants,

places filled with cheaper labor. To meet the situation they are preparing for a fierce fight against any reduction of a scale of wages for the motormen that would reduce the pay below the figure now earned by their own members.

First Fight in New York.

The first move of the campaign has been against the syndicate which will operate the new subway service in New York city. The corporation of which August Belmont is the head has been notified by the motormen of the elevated companies, who are backed by the brotherhood of steam engineers, that the engineers of the new subway service must receive \$3.50 a day, the day being nine hours. This demand was backed up with a threat to tie up the entire elevated service if Belmont and his associates refused.

The wages specified are more than it was originally intended to give the

Competition Fierce.

During the first few years of the new system the competition against the steam roads will be exceedingly fierce. The electric companies will be obliged to use very many more motormen than the number of locomotive engineers employed by the steam roads. Their trains would be lighter and greater in number. If these motormen are to receive the same scale of wages as that paid to the brotherhood, the cost of operating the new roads would be enormously increased, and competition with the old roads seriously handicapped.

The progress in the work of converting steam roads into electric is being carried on rapidly in countries of Europe as well as in America. At present Germany seems to be leading all others. The German companies have gone into the question very thoroughly, and the results they have obtained are most satisfactory. At the recent anniversary of electric railroading, commenced twenty-five years ago, some important figures were given out. It was shown that there existed in Germany, October 31, 1903, 134 main centers (cities of districts) for electric roads, against 42 August 1, 1888. At the same time the mileage had increased to 2,386 miles, the total length of single track being 3,435 miles. The number of motor cars in use had increased to 8,792, with 6,199 trailers.

Results in Germany.

The Germans are using the trolley system. At some places, notably Dresden, the mixed system—trolley and accumulators—is still in vogue. In the Palatinat and on one line at Bremen, however, the accumulator system prevails, but it is expected that it will soon be done away with. On the Berlin-Hamburg station railway preparations are being pushed to electrify the entire road.

One of the principal features of the coming railroads of the country will be the high rate of speed that can be attained with a powerful electric motor. The best speed that could be gotten from the steam roads does not seem impressive compared to the motor racing on open roads in France and Germany. In the United States we have one road, the Reading between Atlantic City and Philadelphia, that maintains a schedule of about eighty-three miles an hour.

The New York Central has made greater speed for comparatively short runs. At some points their engines have probably run over a hundred miles an hour, as claimed. West of Chicago at least two of the connections for the West claimed to have reached and maintained a speed of from ninety to one hundred miles an hour for long runs across the plains.

One of the engineers told a magazine writer about a trip, during which his engine had exceeded a rate of speed that could be shown by his gauges, but that must be taken on faith and with a great deal of faith.

But the recent tests of the motor vehicles have undoubtedly developed bursts of speed of nearly 120 miles an hour. If that can be done on open roadways, what is the limit of the new style motors built for fast running on heavy steel rails laid along rock ballast road beds? If the predictions of the electrical engineers are justified, we may expect to see the motor cars in Washington and wake up to breakfast some point along the Indian River in Florida.

EXTRAVAGANCE OF LIVING RUN WILD--AS SHOWN IN THE NEWEST HOTELS

(Continued from Seventh Page.)

ceiling, and the walls are wainscoted very high with Italian marble. Above this wainscoting the walls are treated in French chrome, highlighted with gold leaf.

To right and left of the main entrance will be cozy smoking corners overlooking Broad Street, and in their ample fireplaces real logs of wood—will make-believe affairs of gas and iron—will blaze and crackle merrily on chilly days.

Relics of Old Clubs.

In one of these corners will be grouped relics of emblems of the Clover Club, the Five o'Clock Club, and other famous social organizations whose home for some time has been the Bellevue.

The office is at the left of the main entrance, facing the elevators. In it hangs a clock with five dials, telling the time in Philadelphia, San Francisco, Manila, Rome, and London.

This body makes a luxurious lounging apartment for guests, its magnificent furniture of Louis XIV style being of mahogany and gold, covered with rich velours de knap, embroidered in gold. Huge chandeliers of gold are filled with electric lights with tinted globes.

The restaurant or main dining room, occupying most of the Chancellor Street, or south, side of this floor, is decorated in a French colonial scheme of the Colonial order. The general impression is soft, old ivory, warming here and there into plinkish tints and deepening sometimes almost to a salmon, highlighted with gold. A large central oval, done in delicate tones, brings out the detail of the lofty ceiling, while an impression of stately dignity is given the room by rows of greenish marble pillars, capped in bronze. All the restaurant furniture is mahogany.

Back of the office is the Viennese room, a smaller apartment of odd fancy and attractive furnishings, which serves as a kind of ante-chamber to the palm garden, which here is called simply the garden. The furniture in the Viennese room is of the Louis XV period, the wood and upholstery being in green and the cane sections in gold.

On the Walnut Street side is the cafe, in which the decoration treatment is novel and effective. Mr. Boldt worked on this a long time before he secured a color combination that suited him. Shade after shade, tint after tint, were tried, only to be rubbed out to make way for another experiment.

The ceiling is in old ivory and the side panels in sunny brown, a new shade that came in numerous mixings of paint. It is a rich, warm hue, harmonizing perfectly with the red marble columns and the dark mahogany woodwork and furniture.

The Marie Antoinette room, or ladies' drawing room, is one of the daintiest, most charming apartments in the Bellevue-Stratford or any other hotel. The color treatment is French gray, highlighted with zinc white. A beautiful mural painting in the oval of the ceiling harmonizes in every tint with the general soft and delicate effect. The side panels are filled with rich French gray damask, and gold is used just sufficiently to heighten the general tone scheme. The furniture is of the Louis XVI style, of gold, upholstered in broad-cloth silk.

A feature of this main floor is a mezzanine gallery promenade that winds beside or into all the large rooms. It is designed especially for ladies who like to stroll about after dinner watching the animated scenes in lobby, cafe or garden and listening to the music.

Apartments Named for Color.

On the first floor (the second story) are a number of large and handsome state apartments, named according to the

general color scheme employed in the decoration of each. They are to be used either as banquet halls or as the parlors or dining rooms of suites. Large card parties or dances may be given in some. The wall paper for each was especially made, and all the other decorations and the furniture designed to suit the paper. In all these hangings of silks, velvets and flocks are extensively used.

There is a Royal Blue room, for instance, the stateliness and beauty of which is indicated by the name. Another state parlor is hung in hand-made silk cloth, designed after the period of Louis XIV. The debutante's room, or queen Elizabeth style, the walls hung with the finest red damask and silk, and the ceiling done in old ivory. The green room is resplendent with its hand-made pressed paper; the pink room is reminiscent of the Italian renaissance, with a mural painting in the oval of the ceiling. In the gold room imported hand-made teko adorns the walls—the first use of this material in this country. In addition there are a pink room, a clover room, and several others equally as well and costly.

The rooms can be thrown into suites when desired.

There are several bridal suites, adorned with an especial view to pleasing the eye and fancy at the most rosyate period of life. The daintiest colorings are worked out in the mural decorations and draperies; the Louis XV furniture is cunningly inlaid with ivory, pearl, and rare and aromatic woods. A honeymoon amid such surroundings cannot but be "one glad, sweet song."

In all the private dining rooms the mahogany inlaid furniture is of the Chippendale period, and the parlor furniture, mostly in gold, represents the time of Louis XV and Louis XVI. Nearly all these parlors are papered in some pleasing shade of gray.

Down below the level of the street, in the basement and sub-basement, are the purely industrial sections of the hotel. Of these, the kitchen, in the west end of the basement, is the most important feature, as well as one of the most interesting.

How little the public knows, usually, about the stomach of a great hotel! Sixty people—cooks and helpers—man this department, to say nothing of the all-important chef and his immediate staff of aids, checkers, and pantry-keepers.

Here everything moves along under the most rigid and thorough system. Each man has his own duty to perform, and pays no attention to anyone else.

Where the Meals Are Cooked.

One cook, for instance, devotes his attention to fish, another to roasts, another to the broiler, still another to soups, and again one to vegetables, and so on down the line. Of course, more than one may be employed in any one line—it depends upon the demand there. Some of the helpers do nothing but peel potatoes; others, in the same way, have their own particular occupations.

Then there are bakers, confectionery makers, men who make dainty ice cream, who look after game, others who do nothing but boil coffee. All these departments front on a kind of lobby, surrounded by tables.

This kitchen of the Bellevue-Stratford is said to be the largest in the country, next to that of the Waldorf-Astoria, and is certainly equipped in the latest and most scientific manner. The big double-front range has eighteen fires and as many ovens, in addition to which there are broilers and separate ovens for roasting. The hood over this great fire tank is so arranged as to carry off nearly all the heat and render the temperature of the working quarters comfortable. There is also a large double bake oven, with porcelain brick front. One side of this is used for pastry alone.

All the cooks' tables are of iron, with polished steel tops—said to be superior to either marble or glass. Every accessory is devised to further prompt service and convenience. Right at hand is a big closet, one side for keeping plates hot, the other for keeping them cold. Even the ice cream freezers are run by electric motors.

One thing isn't generally known about the presiding genius of the cook's kingdom—the chef—and that is, that he must

possess an astonishing amount of all-around knowledge if he would keep abreast of the requirements of the times. It doesn't do now at all that a chef merely knows a fine piece of meat and how to cook it, or to arrange the menu of a dinner party.

In the southeast corner of the basement, at Brod' and Chancellor Streets, is the barber shop and Turkish bath section, all luxuriously fitted up, with manicuring room adjoining.

Here, too, is a new feature—a barber shop for women! It adjoins that for the men, and is entered from a separate hallway. No razors are kept there, but the three attendants cut and dress hair, shampoo, and in other ways attend to the needs of a fashionable coiffure.

Away down in the sub-basement, two full stories below the street, is the pulsating heart that gives life and energy to the whole vast industrial system. This is the big engine and boiler room. Power for the establishment is furnished by four 250 kilowatt direct-current electric generators, connected with six motors, running from 65 to 90-horse power.

The immense wine cellar occupies one side of the sub-basement. Here are tier after tier of barrels and kegs, racks, shelves, and boxes full of bottled goods; a refrigerating room, and modern appliances for keeping the different wines and liquors at the various temperatures necessary. Dumbwaiters run from this cellar to all floors above, and orders may be called down through speaking tubes or telephones. An expert is in charge of this department. Each year he will visit Europe and return with from \$100,000 to \$150,000 worth of liquors of rarest vintage. This, in addition to the immense supplies of domestic goods required.

One of the most interesting features of a great hotel like the Bellevue-Stratford is the item of help.

There are clerks, bookkeepers, cashiers, stenographers, musicians, waiters, bellboys, hallmen, baggage-men, porters, chambermaids, window-cleaners, valets, "omnibuses" (waiters' assistants,

who carry away dishes), checkers, bartenders, winerom clerks, packers and shippers, laundry men and women, elevator boys, cooks, bakers, butchers and pastry-men, dishwashers, manicurists, barbers, bootblacks, Turkish bath men, linen-room girls, telegraphers, seamstresses and menders, cigar and newsstand men, engineers, firemen, oilers, steamfitters, electricians, carpenters, machinists, plumbers, locksmiths, painters, masons, footmen, wagon drivers.

And others, who probably escaped this particular census enumerator.

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The perfection reached in every department of these new homes for the public makes one wonder what can be done next in the way of improvement. There is no comfort of homes, or privacy either, that the new managements do not claim to be able to furnish—always provided, of course, that you have the wherewith to pay for it all. A comparison of the present splendor with descriptions of the hostilities of twenty, or even ten years ago, will furnish a fruitful topic for philosophic meditation.

Was a Real Farmer.

"Oh, yes," a man in the hotel lobby was overheard to say, "I'm a real farmer now. My farm only costs me about \$75 per month now, so you can see I'm getting along." Then the man was heard to comment upon farm labor.

"It's all right to talk about the poetry of farm life," he said, "but if farm life is poetry I want the poorest sort of prose in mine. Is there any poetry in greasing harness? Do you find any rhyme and rhythm in milking a double-jointed, back-acted cow twice a day? Well, I guess not."

"But there's the scenery," his companion interjected, "and the smell of grain—"

"Yes," said the amateur farmer, "and the chiggers and the red bugs, and holes in the fence, and rats in the seed corn, and the potatoes sprouting. And if you are through plowing for a while and haven't anything better to do you can fix a wheelbarrow for recreation, or you can see that the job is made hog-proof, or that the water trough doesn't leak too much. Then if everything else fails and it's too rainy to do anything else you can get out a second-hand hat and fix the crupper on the harness, or nail strips of boiler plate on the feed box so that crib-eater of a plug won't have too many splinters in him when he dies. Oh, you can bet I'm too much of a farmer to look at the poetic side of it. I'm a realist farmer, that's what I am."—Dallas News.